

DIESEL: BRAKE SYSTEMS

COURSE DESCRIPTION

***Diesel: Brake Systems* is a course offering training in the diagnosis and repair of systems used in medium/heavy trucks to include standard and anti-lock brake systems. Students will learn to diagnose, repair and/or service truck hydraulic, air, and antilock brake systems to original equipment manufacture's (OEM) specifications. Course content prepares students for entry level employment in diesel brake systems, continuing education in diesel technology and post secondary education. Students completing the Diesel: Brake Systems course will be eligible to take the ASE written examination for Brakes in Medium/Heavy Trucks.**

Prerequisite(s):

Transportation Core

Algebra I or Math for Technology II; Physical Science or Principles of Technology I (may be concurrent)

Required:

A minimum of 95 hours must be dedicated to diesel brake systems to meet minimum standards set by NATEF.

Recommended Credits:

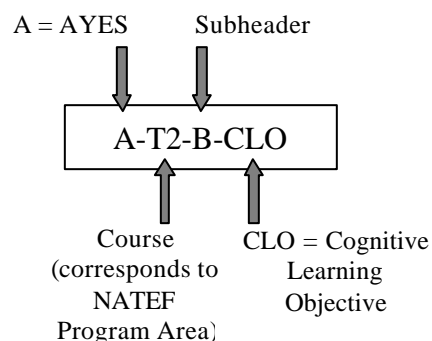
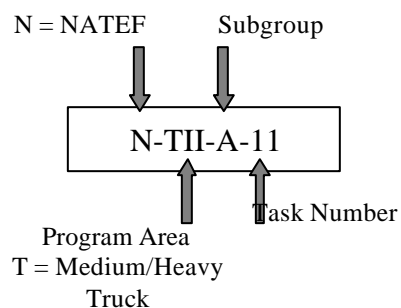
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Recommended Grade Level(s):

11th or 12th

Notes:

Course is aligned with NATEF tasks list for medium/heavy trucks. Items have been organized based on the requirements of the state-required course description format. NATEF tasks are referenced with the corresponding Performance Standards. Codes are as follows:



DIESEL: BRAKE SYSTEMS STANDARDS
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- 1.0 Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.
- 2.0 Students will demonstrate diesel technology practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for a diesel repair facility.
- 3.0 Students will apply fundamental science concepts to truck brake technology.
- 4.0 Students will properly test, diagnose, and repair air brake air supply and service systems.
- 5.0 Students will properly test, diagnose, and repair air brake mechanical/foundation brakes.
- 6.0 Students will properly test, diagnose, and repair air operated parking brake systems.
- 7.0 Students will properly test, diagnose, and repair hydraulic brake systems.
- 8.0 Students will properly test, diagnose, and repair hydraulic brake mechanical/foundation brakes and power assist units.
- 9.0 Students will properly test, diagnose, and repair air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC).
- 10.0 Students will demonstrate communication skills required in the diesel service industry.
- 11.0 Students will demonstrate interpersonal and employability skills required in the diesel service industry.

DIESEL: BRAKE SYSTEMS

STANDARD 1.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

LEARNING EXPECTATIONS

The student will:

- 1.1 Exhibit positive leadership skills.
- 1.2 Participate in SkillsUSA-VICA as an integral part of classroom instruction.
- 1.3 Assess community and workplace situations and apply problem-solving and decision-making skills.
- 1.4 Demonstrate the ability to work cooperatively with others in a professional setting.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 1.1 Demonstrates character, leadership, integrity, creativity, and critical-thinking skills.
- 1.2.A Applies the points of the creed to personal and professional situations.
- 1.2.B Participates and conducts meetings and other business according to accepted rules of parliamentary procedure.
- 1.3.A Analyzes situations in the workplace and uses problem-solving techniques to solve the problem.
- 1.4.A Participates in a community service project.
- 1.4.B Assists with an officer campaign with Tennessee SkillsUSA-VICA.

SAMPLE PERFORMANCE TASKS

- Create a leadership inventory and use it to conduct a personal assessment.
- Participate in various SkillsUSA-VICA programs and/or competitive events.
- Evaluate an activity within the school, community, and/or workplace and project effects of the project.
- Implement an annual program of work.
- Prepare a meeting agenda for a SkillsUSA-VICA monthly meeting.
- Attend a professional organization meeting.
- Participate in the American Spirit Award competition with SkillsUSA-VICA.

INTEGRATION LINKAGES

SkillsUSA-VICA, *Professional Development Program*, SkillsUSA-VICA, Communications and Writing Skills, Teambuilding Skills, Research, Language Arts, Sociology, Psychology, Math, Math for Technology, Applied Communications, Social Studies, Problem Solving, Interpersonal Skills, Employability Skills, Critical-Thinking Skills, SCANS (Secretary's Commission on Achieving Necessary Skills), Chamber of Commerce, Colleges, Universities, Technology Centers, and Employment Agencies

DIESEL: BRAKE SYSTEMS

STANDARD 2.0

Students will demonstrate diesel technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for a diesel repair facility.

LEARNING EXPECTATIONS

The student will:

- 2.1 Determine the safe and correct application for chemicals used in a diesel repair facility.
- 2.2 Use protective clothing and safety equipment.
- 2.3 Use fire protection equipment.
- 2.4 Follow OSHA and EPA regulations affecting diesel service technology.
- 2.5 Respond to safety communications.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 2.1.A Conforms to federal, state, and local regulations when handling, storing, and disposing of chemicals.
- 2.1.B Ensures proper ventilation for chemical use.
- 2.1.C Locates first aid supplies.
- 2.2.A Demonstrates proper usage of special safety equipment.
- 2.2.B Selects and uses the appropriate protective clothing for a given task.
- 2.2.C Demonstrates the use of eye protection.
- 2.3.A Distinguishes the proper fire extinguisher for each class of fire.
- 2.3.B Demonstrates the proper use of a fire extinguisher.
- 2.4.A Locates regulatory information.
- 2.4.B Extracts information from Material Safety Data Sheets pertaining to shop chemicals.
- 2.4.C Complies with relevant regulations and standards.
- 2.5.A Interprets safety signs and symbols.
- 2.5.B Complies with safety signs and symbols.

SAMPLE PERFORMANCE TASKS

- Assess the work area for safety hazards.
- Design a corrections program for identified hazards.
- Model the appropriate protective equipment for an assigned task.

INTEGRATION LINKAGES

Science, Math, Math for Technology, Technology Literacy, Applied Communications, Problem-Solving, National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, (EPA), Tennessee Occupational Safety and Health Administration (OSHA), SkillsUSA-VICA, Secretary's Commission on Achieving Necessary Skills (SCANS)

DIESEL: BRAKE SYSTEMS

STANDARD 3.0

Students will apply fundamental science concepts to truck brake technology.

LEARNING EXPECTATIONS

The student will:

- 3.1 Examine how physics concepts apply to brake system operation.
- 3.2 Explore the application of fundamental laws of hydraulics to brake hydraulic systems.
- 3.3 Analyze the characteristics and properties of liquids as applied to brake fluid.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 3.1. Correlates the following concepts with their role in braking systems:
 - mass
 - force
 - acceleration
 - energy
 - heat
 - temperature
 - pressure
 - friction
 - coefficient of friction
 - inertia
 - momentum
 - speed
 - work
 - torque
 - power
- 3.1.B Examines the effects of weight and speed on braking and stopping distance.
- 3.1.C Explores thermal expansion of fluids, gases, and solids.
- 3.1.D Correlates principles of thermodynamics with braking.
- 3.1.E Considering Newton's laws of motion, determines which concepts of force, mass, and acceleration apply to braking.
- 3.1.F Illustrates how motion converts to heat energy.
- 3.2.A Interprets the laws of hydraulics as applied to brakes systems.
- 3.2.B Relates atmospheric pressure to the term vacuum.
- 3.3.A Assesses the characteristics of liquids.
- 3.3.B Determines the properties of brake fluid.

SAMPLE PERFORMANCE TASKS

- Calculate stopping distance for a vehicle of a given weight at a given speed.
- Diagram the process of braking, identifying the forces and principles at work in each step.

INTEGRATION LINKAGES

State Board of Education Approved
February 2002

Science, Math, Math for Technology, Technology Literacy, Applied Communications, Problem-Solving, National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, (EPA), Tennessee Occupational Safety and Health Administration (OSHA), SkillsUSA-VICA, Secretary's Commission on Achieving Necessary Skills (SCANS)

DIESEL: BRAKE SYSTEMS

STANDARD 4.0

Students will properly test, diagnose, and repair air brake air supply and service systems.

LEARNING EXPECTATIONS

The student will:

- 4.1 Analyze the function and operation of air supply and service systems.
- 4.2 Test, diagnose, and repair or replace air supply and service systems and components.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 4.1.A Examines the air brake system requirements of the FMVSS (Federal Motor Vehicle Safety Standard) 121 requirements.
- 4.1.B Illustrates the operation of the following:
 - air brake supply system,
 - air brake system governor and compressor,
 - air brake control system,
 - check valves,
 - low pressure warning devices, and
 - components that remove water from the air brake system.
- 4.2.A Diagnoses poor stopping, air leaks, premature wear, pulling, grabbing, or dragging problems caused by supply and service system malfunctions; determines needed action.
- 4.2.B Checks air system build-up time and determines needed action.
- 4.2.C Drains air reservoir tanks; checks for oil, water, and foreign material; determines needed action.
- 4.2.D Inspects, adjusts, and aligns compressor drive belts, pulleys, and tensioners; replaces as needed.
- 4.2.E Inspects/tests the following and adjusts, repairs, or replaces as needed:
 - compressor drive gear and coupling.
 - air compressor, air cleaner/supply, oil supply and coolant lines, fittings, and mounting brackets.
 - systems pressure controls: governor, unloader assembly valves, intake screens, filters, lines, hoses, and fittings.
 - air system lines, hoses, fittings, and couplings.
 - air tank relief (safety) valves, one-way (single) check valves, two-way (double) check-valves, manual and automatic drain valves.
 - air drier systems, filters, valves, heaters, wiring, and connectors.
 - brake application (foot) valve, fittings, and mounts.
 - stop light circuit switches, wiring, and connectors.
 - hand brake (trailer) control valve, lines, fittings, and mountings.
 - brake relay valve.
 - quick release valves.
 - front and rear axle limiting (proportioning) valves.
 - tractor protection valve.

- emergency (spring) brake control valves.
- inversion valve.
- low pressure warning devices, wiring, and connectors.
- air pressure gauges, lines, and fittings.

SAMPLE PERFORMANCE TASKS

- Determine cause of poor stopping and perform needed repair or replacement to solve problem.
- Inspect a compressor drive belt and determine needed adjustment, alignment, or replacement.
- Determine cause of premature wear on brakes and perform needed adjustment, repair, or replacement to solve problem.

INTEGRATION LINKAGES

Science, Math, Math for Technology, Technology Literacy, Applied Communications, Problem-Solving, National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, (EPA), Tennessee Occupational Safety and Health Administration (OSHA), SkillsUSA-VICA, Secretary's Commission on Achieving Necessary Skills (SCANS)

DIESEL: BRAKE SYSTEMS

STANDARD 5.0

Students will properly test, diagnose, and repair air brake mechanical/foundation brakes.

LEARNING EXPECTATIONS

The student will:

- 5.1 Analyze the function and operation of air brake mechanical/foundation brakes.
- 5.2 Test, diagnose, and repair or replace air brake mechanical/foundation brakes and components.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 5.1.A Illustrates the operation of the following:
 - air brake mechanical/foundation brakes and components.
 - S-Cam type foundation brake assemblies.
 - wedge type foundation brake assemblies, including their self-adjusting mechanisms.
- 5.1.B Compares the design and operation of the different types of automatic slack adjusters.
- 5.2.A Diagnoses poor stopping, brake noise, premature wear, pulling, grabbing, or dragging problems caused by the foundation brake, slack adjuster, and brake chamber problems; determines needed action.
- 5.2.B Inspects and tests the following and repairs or replaces as needed:
 - service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets.
 - camshafts, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor spins, and springs.
 - wedge brake spider, manual and automatic adjuster plungers, housing, and wedge assembly.
- 5.2.C Inspects and services manual and automatic slack adjusters; performs needed action.
- 5.2.D Inspects, cleans, and adjusts air disc brake caliper assemblies; determines needed repairs.
- 5.2.E Inspects and measures the following and performs needed action:
 - brake shoes
 - linings
 - pads
 - drums
 - rotors

SAMPLE PERFORMANCE TASKS

- Determine cause of problem with slack adjuster and perform needed service or repair.
- Conduct a complete brake inspection and determine and perform any indicated replacements or repairs.
- Determine if a poor stopping, brake noise, premature wear, pulling, grabbing, or dragging problem is caused by the foundation brake, slack adjuster, or brake chamber and perform needed action.

INTEGRATION LINKAGES

Science, Math, Math for Technology, Technology Literacy, Applied Communications, Problem-Solving, National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, (EPA), Tennessee Occupational Safety and Health Administration (OSHA), SkillsUSA-VICA, Secretary's Commission on Achieving Necessary Skills (SCANS)

DIESEL: BRAKE SYSTEMS

STANDARD 6.0

Students will properly test, diagnose, and repair air operated parking brake systems.

LEARNING EXPECTATIONS

The student will:

- 6.1 Analyze the function and operation of the air operated parking brake system.
- 6.2 Test, diagnose, and repair or replace air operated parking brakes and components.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 6.1.A Illustrates the operation and identifies the components of the air operated parking system.
- 6.1.B Examines the operation of the parking system control valves, parking system modules, check valves, and the spring brake control valve.
- 6.2.A Inspects and tests the following and replaces as needed:
 - parking (spring) brake check valves, lines, hoses, and fittings.
 - parking (spring) brake application and release valve.
- 6.2.B Inspects and tests the parking (spring) brake chamber diaphragm and seals; replaces parking (spring) brake chamber; and disposes of removed chambers in accordance with local regulations.
- 6.2.C Manually releases (cages) and resets (uncages) parking (spring) brakes in accordance with manufacturer's recommendations.

SAMPLE PERFORMANCE TASKS

- Diagram the operation of the air operated parking system, identifying all components of the system.
- Inspect parking brake components and determine and perform needed service, replacement, or repair.

INTEGRATION LINKAGES

Science, Math, Math for Technology, Technology Literacy, Applied Communications, Problem-Solving, National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, (EPA), Tennessee Occupational Safety and Health Administration (OSHA), SkillsUSA-VICA, Secretary's Commission on Achieving Necessary Skills (SCANS)

DIESEL: BRAKE SYSTEMS

STANDARD 7.0

Students will properly test, diagnose, and repair hydraulic brake systems.

LEARNING EXPECTATIONS

The student will:

- 7.1 Analyze the function and operation of the hydraulic brake system.
- 7.2 Test, diagnose, and repair or replace hydraulic brake system components.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 7.1.A Determines basic brake requirements.
- 7.1.B Correlates terms associated with automotive brake fluid with their definitions.
- 7.1.C Compares and contrasts the different types of master cylinders and illustrates their operation.
- 7.1.D Diagrams the plumbing components of the brake system.
- 7.2.A Diagnoses poor stopping, premature wear, pulling, dragging or pedal feel problems caused by the hydraulic system; determines needed action.
- 7.2.B Checks and adjusts brake pedal pushrod length.
- 7.2.C Inspects the following and replaces as needed:
 - wheel cylinders.
 - disc brake caliper assemblies.
 - brake lines.
 - flexible hoses.
 - fittings.
- 7.2.D Inspects and tests the following and repairs or replaces as needed:
 - master cylinder.
 - metering (hold-off), load sensing/proportioning, proportioning, and combination valves.
 - brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors.
- 7.2.E Inspects and tests brake fluid, bleeds and/or flushes system, and determines proper fluid type.
- 7.2.F Tests and adjusts brake stop light switch, bulbs, wiring, and connectors; repairs or replaces as needed.

SAMPLE PERFORMANCE TASKS

- Determine if a poor stopping, brake noise, premature wear, pulling, grabbing, or dragging problem is caused by the hydraulic system and perform any indicated service or repair.
- Bleed brake system.
- Inspect hydraulic brake system and identify and replace worn components.

INTEGRATION LINKAGES

Science, Math, Math for Technology, Technology Literacy, Applied Communications, Problem-Solving, National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, (EPA), Tennessee Occupational Safety and Health Administration (OSHA), SkillsUSA-VICA, Secretary's Commission on Achieving Necessary Skills (SCANS)

DIESEL: BRAKE SYSTEMS

STANDARD 8.0

Students will properly test, diagnose, and repair hydraulic brake mechanical/foundation brakes and power assist units.

LEARNING EXPECTATIONS

The student will:

- 8.1 Analyze the function and operation of hydraulic mechanical/foundation brakes.
- 8.2 Test, diagnose, and repair or replace hydraulic mechanical/brake mechanical/foundation brakes and components.
- 8.3 Analyze the function and operation of power brake assist systems.
- 8.4 Test, diagnose, and repair or replace power brake assist system components.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 8.1.A Illustrates the function and operation of mechanical/foundation brakes.
- 8.1.B Distinguishes the components of mechanical/foundation brakes.
- 8.2.A Diagnoses poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems; determines needed action.
- 8.2.B Inspects and measures brake drums or rotors; performs needed action.
- 8.2.C Inspects and measures drum brake shoes and linings and pads; inspects mounting hardware, adjuster mechanisms, and backing plates; performs needed action.
- 8.2.D Inspects and measures disc brake pads/linings; inspects mounting hardware; performs needed action.
- 8.3.A Relates atmospheric pressure to the term vacuum and determines the role of each in brake power assist systems.
- 8.3.B Illustrates the operation of the different types of power assist units and their components.
- 8.4.A Diagnoses poor stopping problems caused by the brake assist (booster) system; determines needed action.
- 8.4.B Inspects, tests, repairs, or replaces power brake assist (booster), hoses, and control valves; determines proper fluid type.
- 8.4.C Checks emergency back-up/reserve brake assist system.

SAMPLE PERFORMANCE TASKS

- Determine if a poor stopping, brake noise, premature wear, pulling, grabbing, or dragging problem is caused by the mechanical foundation brake or power assist system and perform any indicated service or repair.
- Inspect hydraulic mechanical foundation brakes and perform any indicated service or repair.

INTEGRATION LINKAGES

Science, Math, Math for Technology, Technology Literacy, Applied Communications, Problem-Solving, National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, (EPA), Tennessee Occupational Safety and Health Administration (OSHA), SkillsUSA-VICA, Secretary's Commission on Achieving Necessary Skills (SCANS)

DIESEL: BRAKE SYSTEMS

STANDARD 9.0

Students will properly test, diagnose, and repair air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC).

LEARNING EXPECTATIONS

The student will:

- 9.1 Analyze the function and operation of antilock brake systems (ABS).
- 9.2 Test, diagnose, and repair or replace antilock brake systems (ABS) and components.
- 9.3 Diagnose automatic traction control (ATC) problems and performs needed action.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 9.1.A Correlates the components of an antilock brake system (ABS) with their roles in system operation.
- 9.1.B Explores the function and basic operation of a microprocessor.
- 9.1.C Determines the types of automotive computer input and output signals.
- 9.1.D Illustrates the operation of a wheel sensor.
- 9.1.E Differentiates between the wheel sensors used by antilock brake computers.
- 9.1.F Examines the uses of the truck electronic service tools (EST) in communicating with ABS computers.
- 9.2.A Observes antilock brake system (ABS) warning light operation and determines needed action.
- 9.2.B Diagnoses antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determines needed action.
- 9.2.C Diagnoses poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determines needed action.
- 9.2.D Inspects, tests, and replaces antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; performs needed action.
- 9.2.E Diagnoses, services, and adjusts antilock brake system (ABS) wheel speed sensors and circuits following manufacturer's recommended procedures (including voltage output, resistance, shorts to voltage/ground, and frequency data).
- 9.2.F Bleeds the ABS hydraulic circuits following manufacturer's procedures.
- 9.3.A Observes automatic traction control (ATC) warning light operation and determines needed action.
- 9.3.B Diagnoses automatic traction control (ATC) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determines needed action.

SAMPLE PERFORMANCE TASKS

- Use a scan tool to diagnose a problem with an antilock brake system (ABS) electrical component.
- Determine cause of automatic traction control (ATC) warning light failure and perform needed action.

INTEGRATION LINKAGES

Communication Skills, Teamwork Skills, Computer Skills, Reading and Writing Skills, Language Arts, Problem Solving, Interpersonal Skills, Employability Skills, Critical-Thinking Skills, National Institute for Automotive Service Excellence, National Automotive Technician Education Foundation, Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, (EPA), Tennessee Occupational Safety and Health Administration (OSHA), SkillsUSA-VICA, Secretary's Commission on Achieving Necessary Skills (SCANS)

DIESEL: BRAKE SYSTEMS

STANDARD 10.0

Students will demonstrate communication skills required in the diesel service industry.

The student will:

- 10.1 Communicate and comprehend oral and written information typically occurring in the diesel service workplace referring to brake systems.
- 10.2 Solve brake problems and make decisions using a logical process.
- 10.3 Use teamwork skills to accomplish goals, solve problems, and manage conflict within groups.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 10.1.A Interprets and uses written information in common job formats, such as tables, charts, and reference materials and manuals.
- 10.1.B Interprets and uses graphical information such as blueprints, electrical schematics, process control schematics, automotive flow charts, and other medium/heavy truck diagrams referring to brake systems.
- 10.1.C Uses electronic resources to obtain diagnostic service and other medium/heavy truck information.
- 10.1.D Analyzes information obtained from various sources to determine a diagnostic approach.
- 10.1.E Communicates clearly and appropriately in oral and written form.
- 10.1.F Interprets medium/heavy truck repair orders for brake systems.
- 10.2.A Develops a hypothesis regarding the cause of a brake system problem.
- 10.2.B Tests the hypothesis to determine the solution to the brake system problem.
- 10.2.C Creates, evaluates, and revises as needed a plan to resolve a problem.
- 10.2.D Follows strategy based diagnostic procedure to verify the complaint, define the problem, isolate the problem, validate the problem, make the repair, and test the repair.
- 10.3.A Serves in each of the functional roles of a team within a service facility.
- 10.3.B Resolves conflicts within a group.
- 10.3.C Demonstrates appropriate and positive examples of giving and accepting criticism.
- 10.3.D Modifies behavior and revises work based on appropriate criticism.
- 10.3.E Cooperates with other members of a group to research future trends in brake systems.
- 10.3.F Evaluates the role of the automotive technician within the organizational system of a dealership or fleet shop.

SAMPLE PERFORMANCE TASKS

- Use reference materials to determine procedures for diagnosing and testing brake systems.
- Work as a team member to develop a diagnostic strategy.
- Use blueprints and diagrams to execute a task.
- Using case scenarios, follow strategy based diagnostic procedure to:
 - Verify the complaint.
 - Define the problem.
 - Isolate the problem.
 - Validate the problem.

- Make the repair.
- Test the repair.
- Complete a repair order using technical writing skills and calculate salary earnings based on the repair order description.

INTEGRATION LINKAGES

Mathematics, Math for Technology, Physics, Science, Technology Literacy, Applied Communications, Problem-Solving, National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), SkillsUSA-VICA, AYES Curriculum, National Science Foundation, Computer Skills, Internet Navigation Skills, Presentation Skills, Critical Thinking and Problem Solving, Technical Writing Skills, Following Trouble Tree/Schematics, Secretary's Commission on Achieving Necessary Skills (SCANS), Occupational Safety and Health Administration (OSHA), Tennessee Occupational Safety and Health Administration (TOSHA), Environmental Protection Agency (EPA)

AUTOMOTIVE TECHNOLOGY: BRAKE SYSTEMS

STANDARD 11.0

Students will demonstrate interpersonal and employability skills required in the diesel service industry.

LEARNING EXPECTATIONS

The student will:

- 11.1 Analyze relationships between work ethics, organizational skills, and personal job success.
- 11.2 Demonstrate attitudes conducive to working in a team.
- 11.3 Compare the correlation between a clean orderly work environment and successful and efficient job performance.
- 11.4 Assess implications of diversity for communities and workplaces.
- 11.5 Develop individual time management and work sequencing skills.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 11.1.A Illustrates the concept of a “work ethic.”
- 11.1.B Assesses the potential impact of an individual’s work ethic on an organizational system.
- 11.1.C Infers the relationship between work ethics and personal job success.
- 11.2.A Judges which attitudes are conducive to success.
- 11.2.B Modifies behavior to reflect attitudes for success.
- 11.3.A Keeps work area organized and free from clutter and maintains tool and equipment control.
- 11.3.B Cleans work area according to shop standard and NATEF, and OSHA requirements.
- 11.3.C Maintains a neat and orderly work area.
- 11.4.A Points out benefits and problems that may arise from diversity in manufacturers.
- 11.4.B Devises solutions to problems arising from diversity in individuals, cultures, and manufacturers.
- 11.4.C Demonstrates proper dress and grooming for work in an automotive service facility.
- 11.5.A Assesses the benefits of incorporating time management principles into brake service.
- 11.5.B Displays time management and work sequencing skills in brake service.
- 11.5.C Demonstrates the ability to diagnose and repair brake service jobs within the manufacturer’s labor operation time.

SAMPLE PERFORMANCE TASKS

- Maintain an orderly work area.
- Lead a problem solving team.
- Consistently arrive at class on time.
- Serve as an intern with a dealership or fleet shop.
- Resolve an interpersonal conflict in the classroom.

- Using case scenarios, follow strategy based diagnostic procedure to:
 - Verify the complaint.
 - Define the problem.
 - Isolate the problem.
 - Validate the problem.
 - Make the repair.
 - Test the repair.
- Complete a repair order using technical writing skills and calculate salary earnings based on the repair order description.

INTEGRATION LINKAGES

Mathematics, Math for Technology, Physics, Science, Technology Literacy, Applied Communications, Problem-Solving, National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), SkillsUSA-VICA, AYES Curriculum, National Science Foundation, Computer Skills, Internet Navigation Skills, Presentation Skills, Critical Thinking and Problem Solving, Technical Writing Skills, Following Trouble Tree/Schematics, Secretary's Commission on Achieving Necessary Skills (SCANS), Occupational Safety and Health Administration (OSHA), Tennessee Occupational Safety and Health Administration (TOSHA), Environmental Protection Agency (EPA)

DIESEL: BRAKE SYSTEMS

SAMPLING OF AVAILABLE RESOURCES

T4 Brakes Systems Curriculum Module, AYES Corporation, www.ayes.org

2001 Medium/Heavy Duty Truck Task List, National Automotive Technicians Education Foundation (NATEF), www.natef.org

Diesel Technology: Workplace Skills, Instructional Materials Laboratory (IML), University of Missouri

Diesel Technology: Safety Skills, Instructional Materials Laboratory (IML), University of Missouri

Curriculum Integrator, CORD Communications, Waco, Texas 76798

Diesel Technology, Goodheart-Willcox, 2001.